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Abstract

Transgender individuals face heightened risks for discrimination, harassment, and violence that impact their psychosocial well-being and physical health. However, few studies have thoroughly examined the general physical and mental health of transgender adults or within-group health differences by race/ethnicity and income. To that end, after controlling for health insurance status, age, and engagement in exercise, this study asks: (a) are transgender people of color more likely than White transgender individuals to experience poor health outcomes?, and (b) is lower annual household income among transgender adults associated with poorer health outcomes? The current study analyzes secondary data from a survey of transgender adults ($N = 417$) in one state in the Western United States using multiple linear regression and logistic regression models. Transgender people of color had significantly greater odds than their White counterparts of having arthritis/rheumatoid arthritis/gout/lupus/fibromyalgia, or having asthma, but lower odds of being told by a provider that they had depression. Having a lower income was significantly associated with worse general health as well as multiple indicators of poor physical and mental health, including depression, anxiety, and suicidal ideation. We discuss implications for health care delivery for transgender people and for future research.

Keywords: transgender; health; mental health; race; income

A Comparison of Health Disparities among Transgender Adults in Colorado (USA) by Race and Income

Transgender individuals face a variety of risks for discrimination, harassment, and violence that impact their psychosocial well-being and physical health (Bockting, Miner, Swinburne Romine, Hamilton, & Coleman, 2013; Edelman et al., 2015; Grant et al., 2011; Kosenko, Rintamaki, Raney, & Maness, 2013; White Hughto, Reisner, & Pachankis, 2015). However, few studies have thoroughly examined the general physical and mental health of transgender adults (Coulter, Kenst, Bowen, & Scout, 2014; Grant et al. 2011; Institute of Medicine [IOM], 2011; MacCarthy, Reisner, Nunn, Perez-Brumer, & Operario, 2014). Although there is substantial research documenting health disparities in the general U.S. population by race and ethnicity and socioeconomic status, we know relatively little about within-group differences in health by these factors for transgender Americans (IOM, 2011). The present study aims to fill these gaps in the knowledge base utilizing a statewide sample of transgender adults from Colorado, USA.

In this article, we adopt a definition of the term *transgender* that is similar to that used by the Colorado Transgender Health Survey (which provided the data analyzed in this study): *transgender* refers to a person whose assigned sex at birth is different from the gender they know themselves to be. Some transgender people are prescribed hormones by their doctors, while others undergo surgery in addition to or absent from hormone therapy; many transgender people do not medically transition at all (Coleman et al., 2011). In this article, we will often partner the term transgender with *gender non-conforming*, which is meant to encompass individuals whose gender identity and/or expression does not conform to the traditional gender binary of male/female or masculine/feminine but who may not use the word transgender for themselves. We use the term *cisgender* to refer to people who are not transgender (their gender identity and assigned sex at birth are congruous).

Psychosocial Risks and Related Health Concerns among Transgender Adults

Compared to their cisgender peers, transgender and gender non-conforming people are more likely to experience employment discrimination, lack health insurance, live in poverty, face housing discrimination, be homeless, and lack access to health care (Edelman et al., 2015; Grant et al., 2011; White Hughto et al., 2015). Each of these factors places transgender individuals at risk and increases their chances of negative health outcomes (Edelman et al., 2015; Grant et al., 2011; White Hughto et al., 2015). Some individual states in the U.S. have passed policies protecting transgender people from discrimination; in 2009, Colorado implemented the Colorado Anti-Discrimination Act, which aims to protect lesbian, gay, bisexual, and transgender (LGBT) people from discrimination in employment, public accommodations, and housing (Hunt, 2012). The extent to which this bill has been effective at preventing discrimination specifically for transgender people remains underexplored in the research.

Research on transgender and gender non-conforming people's physical health, including the prevalence of chronic diseases, is relatively scarce (MacCarthy et al., 2014). Until very recently, few population-based health surveys have incorporated questions about gender identity, making it hard to draw equivalent comparisons between transgender and cisgender adults; thus, most comparisons to date have tended to rely upon convenience samples or clinical samples of transgender adults (IOM, 2011). Elevated rates of HIV/AIDS have been well-documented among state-based surveys and convenience samples of transgender adults, especially among transgender women, particularly those who are African American (see, for example, Herbst et al., 2008). Yet, we know relatively little about how other conditions – such as diabetes, high blood pressure, and asthma – impact transgender people (Grant et al., 2011). However, discrimination can translate into physical health problems. In Herman's (2013) study, 54% of

transgender participants reported having health issues such as urinary tract infections, kidney infections, and dehydration related to holding one's bladder (and, presumably, reducing fluid intake) due to trying to avoid using public restrooms because of past experiences of discrimination and harassment in such spaces.

Many transgender people internalize the day-to-day discrimination and stigma associated with gender non-conformity, which may contribute to mental health struggles (Bockting et al., 2013; Fredriksen-Goldsen et al., 2014; White Hughto et al., 2015). Transgender individuals consistently report high rates of depression, anxiety, posttraumatic stress disorder, and substance abuse (Bockting et al., 2013; Kosenko et al., 2013) compared to the general population. Multiple studies of transgender people have found high rates of suicidal ideation and attempts (Edelman et al., 2015; Grant et al., 2011; Reisner, White, Bradford, & Mimiaga, 2014).

When seeking medical services to help address these various physical and mental health conditions, transgender and gender non-conforming people face a variety of barriers including lack of insurance coverage, high costs, discrimination, and a lack of knowledge among providers (Shipherd, Green, & Abramovitz, 2010; Sperber, Landers, & Lawrence, 2005). Because transgender individuals are more likely to lack stable employment, they are also less likely to have access to health insurance (Grant et al., 2011; Shipherd et al., 2010; Spicer, 2010). Of those who are insured, many are insured by public forms of insurance such as Medicare or Medicaid rather than private insurance companies (Grant et al., 2011; Sanchez, Sanchez, & Danoff, 2009). Public insurance tends to be less comprehensive than private insurance, and treatments that specifically relate to one's transgender status are commonly denied coverage by public insurance (Shipherd et al., 2010). At the time of recruitment for the Colorado Transgender Health Survey in 2014, Medicare, being under federal jurisdiction, lifted the ban on transgender exclusions.

However, there was no local or federal coverage determination, so claims were handled on an individual basis and lacked consistency (One Colorado, 2014). During survey recruitment, Medicaid, which was governed by the state of Colorado, excluded transgender-related surgery but was covering hormones for transgender patients (One Colorado, 2014). Shipherd and colleagues (2010) found that even those who have stable insurance (such as Medicare, Medicaid, or private insurance) and access to a primary care provider report cost as a barrier to care. Many of the treatments associated with transitioning are incredibly costly, occur over several years throughout one's life, and often are not covered by insurance (Gehi & Arkles, 2007). Access to hormones and surgeries that affirm one's gender are deemed as medically necessary for transgender people's well-being and mental health (American Medical Association, 2008; American Psychological Association, 2009).

Perhaps the most troubling barrier to medical care is the quality of care provided to transgender patients. Transgender patients frequently experience discrimination when seeking medical care (Grant et al., 2011; Kosenko et al., 2013; Sanchez et al., 2009; Sperber et al., 2005). According to Grant et al.'s national study (2010), 22% face refusal of treatment altogether, 28% face open harassment, and 2% are likely to be victims of violence—all at the hands of medical personnel and staff. Fear of mistreatment and general distrust of medical providers can prevent transgender people from pursuing the health care that they need (Grant et al., 2011; Kosenko et al., 2013). Transgender patients also face barriers such as a lack of access to specialists and transgender-competent providers (Grant et al., 2011; Sanchez et al., 2009; Xavier, 2000). While not all health care providers are openly hostile to transgender patients, many simply lack any understanding of what it means to be transgender (Poteat, German, & Kerrigan, 2013; White Hughto et al., 2015). Transgender patients frequently report having to educate their providers on

the different procedures and practices within the realm of transgender health care (Grant et al., 2011; Xavier, Honnold, & Bradford, 2007). In order to improve the health and quality of life of the transgender community, efforts must be made to reduce cultural biases regarding gender identity and to provide competent care within the health care system (De Vries, Mason, Quam, & Acquaviva, 2009; Kenagy, 2005; Shipherd et al., 2010).

Transgender People of Color and their Health

In the U.S. as well as other nations, people of color face unequal health outcomes compared to their White peers, and this disparity is mirrored within the LGBT community. LGBT people of color face higher rates of HIV infection and diabetes and lower rates of health care access (Krehely, 2009). While there is a significant need for additional research comparing differential health risks by race and ethnicity among transgender individuals, existing studies indicate a disparity at the intersection of race and gender identity that is connected to greater occurrence of poverty, unemployment, discrimination, and violence targeting people of color (Grant et al., 2011; Krehely, 2009). Transgender people of color's health is thus likely to mirror the larger disparities between people of color and Whites in the general population.

Low-income Transgender People's Health

Research suggests that transgender people are more likely to live in poverty than their cisgender peers (Conron, Scott, Stowell, & Landers, 2012). This disparity is likely impacted by the high rates of unemployment and underemployment among transgender people, particularly for transgender people of color (Conron et al., 2012; Grant et al., 2011). Grant et al. (2011) report unemployment rates of 28% among African American transgender and gender non-conforming people, followed by Native Americans (24%), Latinos/as (18%) and Whites (12%). The poverty experienced by many transgender people in the U.S. suggests a higher degree of

eligibility for Medicaid, which varies by state in terms of allowable coverage for transgender-related care such as hormones and gender-affirming surgeries (Gehi & Arkles, 2007). In Colorado specifically, a year before the administration of the Colorado Transgender Health Survey launched, the Colorado Division of Insurance released Bulletin 4.49 stating that discrimination in health coverage based on sexual orientation and gender identity was prohibited in Colorado. This bulletin impacted private insurance by prohibiting health insurers from the following: denying coverage of treatments for transgender policyholders if the same treatments are covered for cisgender policyholders; creating riders that categorically excluded all transgender patients; rating or charging more for individuals based on their sexual orientation or transgender status; or classifying an individual's sexual orientation or transgender status as a pre-existing condition to limit or deny coverage (One Colorado, 2014).

Resilience

Despite the many forms of discrimination and harassment facing transgender and gender non-conforming people, this population remains incredibly resilient in overcoming adversity (Bockting et al., 2013; Grant et al., 2011; Singh, 2013). Researchers and clinicians identify a variety of strategies and coping mechanisms that help to alleviate the psychological stressors of stigma and discrimination (Bockting et al., 2013; Singh, 2013; Singh, Hays, & Watson, 2011). Among these resources are: familial support and acceptance; peer support and acceptance; finding one's place in a supportive community; achieving a sense of pride in their identity; actively defining their identity on their own terms; establishing a sense of self-worth and advocacy; and recognizing the myriad of ways they face oppression (Bockting et al., 2013; Singh, 2013; Singh et al., 2011). Peer support in the form of information sharing has been found to moderate the impacts of stigma and mental health challenges (Bockting et al., 2013; Nemoto

et al., 2011). These sources of resilience can help transgender and gender non-conforming people counteract the effects of widespread discrimination.

Current Study

While research has documented the various psychosocial risks that transgender people face, there are limited studies of specific physical and mental health outcomes for this population. Those that do exist frequently have major methodological limitations, such as grouping transgender individuals with lesbian, gay, or bisexual adults or relying on samples that are clinic-based or restricted to a major urban area (IOM, 2011; MacCarthy et al., 2014). Few state or federal health surveys to date have consistently included questions on gender identity, limiting our abilities to draw inferences about transgender health. Further, we know relatively little about differences in health by race/ethnicity and income. The current study aims to address these gaps in the knowledge base. Our research questions of interest are: Are transgender people of color more likely than White transgender individuals to experience poor health outcomes? Is lower annual household income among transgender adults associated with poorer health outcomes? These questions are addressed while controlling for health insurance status, age, and engagement in exercise in the past month.

Methods

Procedures

This study involves secondary analysis of the Colorado Transgender Health Survey, which was distributed in 2014 and modelled after the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS) survey, an annual health survey conducted in the U.S. (One Colorado, 2014). Survey questions focused on health behaviors, health conditions, and demographics. Some questions were revised and others added

to more accurately capture transgender identities and experiences. Transgender community members were involved in the study's development. This included transgender community members who participated on the survey advisory committee and informed the survey from conception and creation to distribution and reporting on the results. The web-based version of the survey was advertised by LGBTQ community organizations throughout the state, colleges and universities, LGBTQ-affirming health care providers, religious communities, and other social services agencies, as well as the lead organizations. Paper-based surveys were distributed at local transgender-related conferences and LGBTQ pride events, as well as at the lead organization's offices (One Colorado, 2014). The sampling frame included adults who identified as transgender or gender non-conforming and lived in Colorado. The lead author was provided a copy of the de-identified dataset, which had previously been reviewed and cleaned for duplicate responses by the Colorado Department of Public Health and Environment's Health Statistics and Evaluation Branch. Since the analyses involved only anonymous data, this study did not require IRB approval.

Measures

Most health conditions were queried through single items rather than composite measures. The control variables of interest for the present study include: (a) health insurance coverage (a yes/no dichotomous variable); (b) exercise in the past month (a yes/no dichotomous measure); and (c) current age (an interval variable with response options of *Under 18*, *18-24*, *25-34*, *35-44*, *45-54*, *55-64*, *65-74*, and *75 or older*). Predictor variables of interest included race/ethnicity (recoded as a dichotomous White/non-White variable due to the small number [16.3%, n = 65] of persons of color, grouping all Hispanic respondents as people of color regardless of race), and current annual household income (recoded into $25,000 intervals, up to

$75,000 or more). When adding current annual household income to our models, we simultaneously added two variables related to household size (number of adults currently living in the home, and the number of children in the home) so that any interpretation of household income takes household size into account (recognizing that, for example, $50,000 of income has different consequences for a household of one versus a household of seven).

Our dependent variables included both continuous and categorical (dichotomous) variables related to health. Continuous variables analyzed include: (a) general health (how respondents would rate their overall health on a five-point scale ranging from *Excellent* to *Poor*); (b) physical health (how many days in the past month physical health was not good); (c) mental health (how many days in the past month mental health was not good); and (d) the number of days in the past month poor physical or mental health kept the respondent from doing usual activities, such as self-care, work, or recreation. Dichotomous dependent variables included: (a) current Body Mass Index (BMI; a dichotomous variable comparing those of normal BMI [below 25] compared to those who were overweight or obese [above 25]); (b) high blood pressure (lifetime prevalence); (c) high cholesterol (lifetime prevalence); (d) chronic obstructive pulmonary disease (COPD), emphysema, or chronic bronchitis (lifetime prevalence); (e) a depressive disorder (lifetime prevalence, as told by a health care professional); (f) current depression, as measured through eight questions from the Patient Health Questionnaire (PHQ-8), used in BRFSS surveys to detect depressive disorders; (g) arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia (lifetime prevalence); (h) diabetes (lifetime prevalence); (i) asthma (lifetime prevalence); (j) an anxiety disorder (lifetime prevalence); (k) suicidal ideation (past year); (l) suicide attempt (past year); and (m) whether any teeth have been removed due to tooth decay or gum disease. The purpose of our study was to explore the relationships between

variables, and as such, we included all physical and mental health measures from the original survey as dependent variables in our models. We chose not to analyze differences in tobacco, drug and alcohol use here due to our primary emphasis on physical and mental health conditions, though substance use is an area of inquiry that we encourage others to explore with this same dataset. The survey modeled their variables after the U.S. Center for Disease Control and Prevention's *Behavioral Risk Factor Surveillance Survey (BRFSS),* which is considered the "gold standard" in health survey surveillance (One Colorado, 2014, p. 2).

Statistical analyses

We conducted all analyses using SPSS, version 22. We used logistic regression to examine models that had dichotomous dependent variables and multiple linear regression for models with continuous dependent variables.

Results

Sample

Of the 417 transgender and gender non-conforming Colorado residents who responded to this survey, nearly one-third (30.3%, $n = 119$) identified as transgender women, 24.9% ($n = 98$) as transgender men, 18.3% ($n = 72$) as gender queer/gender fluid, 15% ($n = 59$) as women[1], 5.6% ($n = 22$) as men[1], 4.6% ($n = 18$) as transgender, and 1.3% ($n = 5$) as agender/no gender. Just over half (52.2%, $n = 216$) were assigned a male sex at birth, while 47.8% ($n = 198$) were assigned a female sex at birth. In terms of race, the vast majority (88.4%, $n = 352$) identified as White, 8.8% ($n = 35$) identified as multiracial, 1.3% ($n = 5$) identified as American Indian or Alaskan Native, and the remaining 1.6% identified as either Black/African American ($n < 5$), Asian ($n < 5$), or

[1] Each person who participated in the survey had to identify as transgender or gender non-conforming. However, some individuals within the transgender community identify their primary identity as being either men or women following a transition; these subgroups are captured here.

Native Hawaiian or other Pacific Islander ($n < 5$). Less than one in ten respondents identified as Hispanic (6.7%, $n = 28$). Ages ranged from *Less than 18* to *65 to 74*, with *25 to 34 years old* as both the median and mode response.

With regard to educational attainment, most of the sample either had some college education but no degree (26.9%, $n = 111$), an Associate's degree (6.8%, $n = 28$) or a Bachelor's degree (27.4%, $n = 113$), while 8% ($n = 33$) had only a high school diploma, GED, or equivalent degree and 3.6% ($n = 15$) had no high school diploma. Annual household income was reported in fixed intervals, and responses encompassed the full range from *Less than $10,000* to *$75,000 or more*. The median income response was *$25,000 to less than $35,000*; the mode response was *$75,000 or more*. The number of adults in one's household ranged from one to seven, with a mean of 2.11 and a median of two. For number of children in the household, responses ranged from zero to seven, with a mean of 0.34 and a median of zero.

The majority (85.7%, $n = 349$) of respondents had some form of health coverage. The most common types of insurance (some participants had more than one type) were plans obtained through one's own work (33.7%, $n = 117$) or someone else's work (21.6%, $n = 75$), Medicaid (19.3%, $n = 67$), Medicare (10%, $n = 35$), and health insurance bought directly by oneself (8.4%, $n = 29$) or someone else (5.2%, $n = 18$). A small minority (7.2%, $n = 25$) received veteran's insurance. About three in four participants (75.7%, $n = 296$) reported that they had participated in physical activities or exercises other than their regular job in the past month.

Model variables

Correlations for all model variables were examined, and no variables appearing in the same models had more than weak correlations with each other, although some reached statistical significance (not shown here). Descriptive statistics for the health-related dependent variables are

displayed in Table 1.

Inferential statistics

We developed statistical models to address our research questions. Our dependent variables of interest include both continuous measures of health, which were assessed using multiple linear regression, and dichotomous health variables, assessed using logistic regression (see Table 1 for a list of all dependent variables). We report and interpret all models in which annual household income and/or race/ethnicity had statistically significant results.

Multiple linear regression models. In the multiple regression models, annual household income, but not race/ethnicity, produced statistically significant relationships to general health, poor physical health, poor mental health, and the number of days during the past month when an individual was kept from doing usual activities. Results are displayed in Table 2.

General health. There was a significant association between the control variable model (Block 1) and general health, $F(3, 334) = 8.57$, adjusted $R^2 = 0.06$, $p < .001$. The model accounted for about 6% of the variance in general health. Exercising in the past month was associated with a general health score 0.61 points higher ($p < .001$). Each step increase in the age group of respondents is associated with an increase of 0.09 in general health ($p < .05$). In Block 2 of the general health model, $F(7, 330) = 8.18$, adjusted $R^2 = 0.13$, $p < .001$. This full model accounted for 13% of the variance in general health. Exercise in the past month remained statistically significant, while age lost its significance once adding the other predictor variables. When controlling for the number of people in a household, annual household income was significantly related to general health among this sample of transgender adults. Each step

increase in the income scale (e.g., from *Less than $25,000* to *$25,000 to less than $50,000*), was associated with an increase of 0.24 points in general health.

Poor physical health. There was a statistically significant relationship between the control variable model (Block 1) and poor physical health, $F(3, 333) = 5.33$, adjusted $R^2 = 0.04$, $p < .05$. The control variables accounted for 4% of the variance in physical health. Exercise in the past month was statistically significantly negatively associated with poor physical health; engaging in exercise in the past month was associated with having over four fewer days per month of poor physical health. The model with the predictor variables of interest added was also statistically significantly associated with poor physical health, $F(7, 329) = 4.45$, adjusted $R^2 = 0.07$, $p < .001$. This model accounts for 7% of the variance in poor physical health. Exercise in the past month remained significantly negatively associated with poor physical health. Annual household income demonstrated a significant relationship with poor physical health; each step increase in income was associated with 1.4 fewer days per month of poor physical health.

Poor mental health. For Block 1 of the poor mental health model, $F(3, 333) = 10.38$, adjusted $R^2 = 0.08$, $p < .001$. This model explains 8% of the variance in poor mental health. Exercise in the past month and age were both statistically significantly associated with poor mental health. Exercising in the past month was associated with having about six fewer days of poor mental health in the past month. Each step increase in age group was associated with a decrease of 1.22 days per month of poor mental health . For Block 2, $F(7, 329) = 6.73$, adjusted $R^2 = 0.11$, $p < .001$. This model accounts for 11% of the variance in poor mental health. Exercise and age remained statistically significantly associated with poor mental health. Annual household income was also significant: each step increase in the income scale was associated with a decrease of 1.82 days per month of poor mental health .

Number of days kept from usual activities. For Block 1 of the model examining the number of days health problems kept one from engaging in usual activities, $F(3, 330) = 6.49$, adjusted $R^2 = 0.05$, $p < .001$. This model accounts for 5% of the variance in number of days kept from usual activities. Exercise in the past month and age were both statistically significant. Exercising in the past month was associated with having over 4 fewer days in the past month where poor health kept one from usual activities. Each one step increase in age group was associated with a decrease of 0.71 days of poor health that limited engagement in usual activities. In Block 2, $F(7, 326) = 5.48$, adjusted $R^2 = 0.09$, $p < .001$. This model explains 9% of the variance in number of days kept from usual activities. Exercise remained statistically significant, while age lost its significance. Annual household income, after controlling for household size, was statistically significantly negatively associated with poor health days; each one step increase in the income scale was associated with a decrease by just over one and a half days of when poor health limited engagement in usual activities.

Logistic regression models. For the dichotomous dependent variables, both race/ethnicity and annual household income were statistically significantly associated with lifetime prevalence of being told by a doctor that one has depression. Annual household income, but not race/ethnicity, was statistically significantly related to: (a) current depression, (b) anxiety, and (c) suicidal ideation. Race/ethnicity, but not income, statistically significantly associated with lifetime prevalence of: (a) arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia; and (b) asthma. We did not find a statistically significant relationship between race/ethnicity or annual household income and being overweight or obese (compared to normal BMI), high blood pressure, high cholesterol (although income was marginally significant in this model), COPD/emphysema/bronchitis,

diabetes, suicide attempts in the past year (although income was marginal), or having teeth removed due to tooth decay or gum disease. Models with statistically significant results for the predictor variables of interest are displayed in Tables 3 and 4.

Depression (told by doctor). In Block 1 of this model, none of the variables reached statistical significance (age was marginally significant), and the model was only marginally associated with depression diagnosed by a doctor, $\chi^2(3) = 6.80$, $p < .10$. In Block 2, race/ethnicity and annual household income were both statistically significant. Compared to White transgender adults, transgender adults of color had 2.22[2] times lower odds of having been told by a doctor that they have depression. For each step increase in annual household income, the odds of being told by a doctor that one has depression decreased by 20%. The full model accounts for 8% of the variance in depression diagnosed by a doctor.

Current depression. In Block 1 of the current depression model, exercise in the past month and age were statistically significantly associated with current depression. Compared to those who did not exercise in the past month, those who did exercise had 3.85 times lower odds for having current depression. For each one step increase in age group, a person's odds of having current depression decreased by 26%. This model accounted for 13% of the variance in current depression. In Block 2, exercise and age remained statistically significantly associated with current depression. Annual household income was also statistically significantly associated with current depression. For every step increase in the level of annual household income, the odds of having current depression decreased by 41%. This model accounted for 22% of the variance in current depression.

[2] This was calculated using the inverse odds ratio: $\frac{1}{0.45} = 2.22$

Anxiety. In Block 1 of the anxiety model, age was statistically significantly negatively associated with anxiety. For each step increase in age group, the odds of having anxiety decreased by 23%. This model accounted for 6% of the variance in anxiety. In Block 2, age remained statistically significant, and annual household income also was significant. For each step increase in the level of annual household income, the odds of having anxiety dropped by 24%. This model accounted for 10% of the variance in anxiety.

Suicidal ideation. In the first block of this model, exercise in the past month and age were statistically significantly associated with suicidal ideation. Compared to those who did not exercise in the past month, those who did had 54% lower odds of suicidal ideation in the past year. For every one step increase in age group, the odds of suicidal ideation in the past year decreased by 19%. In the full model, exercise in the past month remained statistically significantly associated with suicidal ideation, while age was no longer significant. Annual household income was also significantly related to past year suicidal ideation. For each step increase in the level of household income, the odds of suicidal ideation decrease by 39%. This model accounts for 14% of the variance in suicidal ideation in the past year.

Arthritis, gout, lupus, or fibromyalgia. In Block 1, having health insurance and age were each statistically significantly associated with being told by a doctor that one has arthritis, gout, lupus, or fibromyalgia. Those with health insurance had odds 2.72 times higher for having such diagnoses as those without health insurance. For each step increase in age group, the odds of having one of these diagnoses increased by 1.48. This block accounts for 12% of the variance in these diagnoses. In Block 2, health insurance status and age remained statistically significant variables. Race/ethnicity was also statistically significant; compared to White transgender adults, transgender adults of color had 2.46 times the odds of having been told by a doctor that they had

arthritis, gout, lupus, or fibromyalgia. This full model accounts for 15% of the variance in having one of these diagnoses.

Asthma. None of the control variables were statistically significantly associated with lifetime prevalence of asthma in Block 1, and this block did not reach statistical significance, $\chi^2(3) = 4.45$, $p > 0.10$. In Block 2, health insurance status was marginally significant. Race/ethnicity was statistically significantly associated with having asthma. Compared to White transgender adults, the odds that transgender adults of color had asthma were 2.26 times higher. This model accounted for 6% of the variance in asthma diagnosis.

Discussion

Our sample reported strikingly high rates of both physical and mental health conditions. Although we cannot test for differences between these rates and surveys of general populations of adults due to differences in sampling method, we highlight some differences with Colorado data here. This sample of transgender adults had elevated rates of high blood pressure (31.8%, compared to 26.3% among Colorado adults in general; CDC, 2015), asthma (26.7% compared to 13.5%; CDC, 2015), an average of 6 days (vs. 3 days) in the past month of poor physical health (One Colorado, 2014), high proportions of fair/poor overall health (18.6% vs. 13.2%; CDC, 2015) and about 7 days (vs. 4 days) in the past month where health issues kept them from doing their usual activities (One Colorado, 2014). Pertaining to mental health, our sample reported an average of almost 11 days in the past month of poor mental health compared to 3 days among Colorado adults in general (One Colorado, 2014). In addition, the sample had notably high rates of current depression (44% vs. 7% among Colorado adults in general), anxiety diagnosis by a doctor (53% vs. 13%), and suicidal ideation (36% vs. 4%; One Colorado, 2014). These rates are similar to results from other studies of transgender people's mental health (SAMHSA, 2012, F–

1). The reasons for increased mental health issues among transgender people are often tied to social stigma, rejection from family members, lack of social support, and limited availability of culturally competent behavioral health services in parts of the country (Bockting et al., 2013; Edelman et al., 2015; Grant et al., 2011; Poteat et al., 2013; White Hughto et al., 2015).

Even though findings for the overall sample noted physical and mental health disparities, transgender people of color and transgender people with lower incomes reported worse health in certain areas. Specifically, having a lower income was significantly associated with worse general health, more days per month of poor physical health, more days per month of poor mental health, and more days where one's health issues prevented engagement in usual activities. There is a significant body of research regarding the link between socioeconomic status and health disparities; the deep influence of socioeconomic status is often tied to related patterns of health care access, health-related behaviors, and one's environment (Adler & Newman, 2002).

These trends are particularly influential among transgender individuals, who face a wide range of discrimination and mistreatment, making them more likely than their cisgender peers to experience increased rates of job discrimination and unemployment (Grant et al., 2011; Spicer, 2010). Transgender individuals who lack stable employment and income are less likely to have health insurance or access to quality health care (Grant et al., 2011; Shipherd et al., 2010; Spicer, 2010); they are also more likely to live in poverty, be homeless, and engage in sex work or other work in the street economy (Bockting, Robinson, & Rosser, 1998; Lombardi, 2010; Spicer, 2010). Such factors place an already marginalized population at increased risk for a diverse range of poor health outcomes (Edelman et al., 2015; Grant et al., 2011; White Hughto et al., 2015). The stressors associated with living in poverty are also associated with a variety of mental and physical health conditions (Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010). The

present study adds to the literature reflecting the connection between socioeconomic status and health among transgender people and emphasizes the need for targeted health prevention and intervention efforts with low-income transgender people.

Within our study, being a transgender person of color was associated with greater odds of having arthritis/rheumatoid arthritis/gout/lupus/fibromyalgia, or having asthma. There is a substantial body of research regarding the connections between environmental racism and increased exposure to environmental toxins among cisgender people of color (for example, see Hernandez, Collins, & Grineski, 2015). Further, research has started to document a link between experiences of stress, such as racism, and particular physical health conditions such as adult-onset asthma (Coogan et al., 2014) and auto-immune disorders (Djuric et al., 2008). Such patterns are similarly manifested within our sample of transgender adults, indicating differential risks by race as a reflection of the compounded stress experienced by these subgroups. These findings coincide with the vast majority of research on the transgender community, which highlights how the combined effects of transphobia and racism work to exacerbate health disparities among transgender people of color (Edelman et al., 2015; Grant et al., 2011; Krehely, 2009). While a sizeable body of research looks at transgender health disparities related to rates of HIV/AIDS—which are higher among transgender people of color, particularly African Americans—other important health issues that likely differ by race or ethnicity among transgender people have been overlooked (Krehely, 2009).

Neither income nor race/ethnicity were significantly associated with some of the other physical and mental conditions examined, such as being overweight/obese, high blood pressure, high cholesterol, COPD/emphysema/chronic bronchitis, diabetes, or whether one had teeth removed due to dental problems. It is unclear if these conditions do not differ by race/ethnicity or

income, or if our sampling methods limited our ability to detect differences. Further, some conditions, such as diabetes and COPD, affected a very small minority of the sample (<5%), which may have impacted our ability to detect between-group differences.

Having a low annual household income was also a significant factor when assessing current depression, anxiety, and past year suicidal ideation. Highlighting these outcomes is important due to the fact that socioeconomic status is known to be a significant factor in terms of predisposition, recurrence, and treatment of mental illness (CDC, 2004; Sareen, Afifi, McMillan, & Asmundson, 2012; Santiago, Kaltman, & Miranda, 2013). However, neither income nor race/ethnicity was significantly associated with suicide attempts in the past year. We could speculate that although suicidal ideation was more likely among transgender adults who were lower income, perhaps there is resilience and social support in this community that protects them from attempting suicide in the past year at higher rates; such conjecture is worth studying in future research. Interestingly, we found that being a transgender person of color was significantly associated with a *lower* likelihood that a doctor had ever diagnosed the respondent with depression. This finding may reflect common patterns whereby adults of color are sometimes *underdiagnosed* with mental health conditions, such as depression, or where the symptoms of such diagnoses look different by racial subgroups (Suite, La Bril, Primm, & Harrison-Ross, 2007). Further investigation is needed to explore the meaning of this finding in greater depth and detail.

Limitations

The data we utilized are based on self-reports from transgender individuals. Hence, any report of illness could not be corroborated by medical records. Further, the majority of the sample self-identified as White (88%) and only 7% were Hispanic, whereas U.S. Census Bureau

data (2015) suggest that the state of Colorado has a Hispanic population of 21.2%. Additionally, our decision to limit comparisons to Whites versus all other racial/ethnic groups due to the proportion of respondents of color (16.3%) over-simplifies analyses and implications we can draw. A more representative and diverse sample would have allowed for more detailed analyses of racial and ethnic disparities. Another limitation of this study is the use of a convenience sample of transgender individuals via LGBTQ organizations and other agencies, which biases the data; those responding to the survey may be more connected to LGBTQ networks and more likely to live in an urban area than the general population of transgender people. Additionally, since the original study only targeted transgender and gender non-conforming people, we were unable to test for statistical differences with cisgender counterparts.

Many of our models had relatively small amounts of variance explained by the models (all Adjusted R^2 results were $\leq .13$, and all Nagelkerke R^2 results were $\leq .22$). Thus, our models only explain a small proportion of the variance in our dependent variables, suggesting that many other factors that contribute to transgender health were not incorporated into our analysis. We may be detecting statistical significance with these models due to the large numbers of variables entered (including single item measures), and yet the impact of these variables may be quite minimal in understanding health among transgender adults. Such a limitation is worth noting when drawing implications from this study.

Our sample's median age was *25 to 34 years old*, and there were few older respondents. Older transgender people are not well represented in research (Fredriksen-Goldsen et al., 2014) and they may not be as connected to community-based LGBT organizations, which was one method used to recruit these participants. A final limitation is rooted in the use of the terms transgender and gender non-conforming. Using transgender as an umbrella term that

encompasses transwomen and transmen as well as those who are gender non-conforming may overly simplify the differences in these groups. In fact, many people who are gender non-conforming do not identify as transgender. However, most studies utilize the term as to encompass these multiple groups, even if it misidentifies those who do not use the word transgender for themselves. The present study considers data by all gender non-conforming self-identifiers as well as those who identified as transgender. We did not analyze health conditions by gender subgroup, and thus are not able to draw conclusions here about particular disparities by gender identity.

Implications for Health Care Practitioners

There is a need to consider ways in which practitioners can be more competent and inclusive in order to improve access to healthcare for transgender people (Poteat et al., 2013; Singh et al., 2011; White Hughto et al., 2015). Providers should address health disparities in transgender persons by adjusting their standards of practice to be more inclusive and sensitive to transgender identities and needs. Changes could commence by having providers engage in cultural competence training that is transgender specific. These trainings should also address the intersectionality of race/ethnicity and income as determinants of health. Furthermore, health care providers who deliver mental or physical health services must stay up-to-date in evidence-based practices that positively affect the quality of care of transgender people. Consultation with transgender-led community agencies could also be valuable. Competent healthcare does not begin with one's interaction with a primary care provider, but also includes the staff involved in the care setting, such as front desk personnel, technicians, and other supportive staff. Staff should be knowledgeable of and competent regarding transgender language and culture. Moreover, a transgender competent practice also encompasses transgender inclusive language in signs, forms,

electronic records, and assessments. When attempting to become more competent, providers often utilize their transgender patients or consumers as educators (Grant et al., 2011; Xavier et al., 2007). This approach is problematic, not only because one person cannot be presumed to represent all transgender people but also because it should not be the responsibility of a patient to educate a health care provider on a minority identity. Consulting with a patient should not be considered a substitution for professional continuing education activities.

Another significant factor affecting health outcomes in transgender persons is the lack of access to care or ability to afford care (Shipherd et al., 2010; Sperber et al., 2005). Practitioners should be aware of their role in the macro arena when pertaining to these areas. Policies and funding are designed and generated based on documented needs (i.e. research, case studies), professional statements from providers, and statistics based on services rendered. When advocating and designing programs that facilitate access to care and diminish barriers to care, providers should take into account intersectionality of identities and lifespan needs. For example, it is important to have services available to transgender persons of color, those with limited-English proficiency, people of diverse ages, and people of different socio-economic statuses. Healthcare services for transgender individuals should be holistic and take into account biopsychosocial-spiritual needs beyond those related to one's gender identity.

Implications for Future Research

We encourage other researchers to add to the knowledge base in the area of transgender health and replicate similar studies in other regions of the U.S. or in other countries. Future research should take into account the diversity of identities used by gender non-conforming individuals, including those who do not use the term "transgender" for themselves. Moreover, the present study was not able to explore racial differences in health beyond a White/non-White

comparison. Researchers are encouraged to develop means for purposefully over-sampling populations of color to allow for additional comparisons by race and ethnicity. Additionally, other researchers may wish to explore differences between transgender subgroups in terms of drug, alcohol, or tobacco use, topics that we did not analyze in this study.

Our study indicates patterns of health disparities by race/ethnicity and household income among transgender adults. Future research might explore the predictive role of experiences of discrimination, cumulative stress, and the connection to health outcomes, including depression, suicidality, asthma, and autoimmune disorders, for these transgender subgroups. Additionally, the knowledge base would benefit from deeper exploration of environmental influences on transgender health by race and socioeconomic status. Longitudinal studies could offer clarity on how health challenges manifest over the life course for transgender people and could also provide evidence for the association between the many variables that impact transgender people's lives. Finally, future research might focus on how as access to the Affordable Care Act and same-sex marriage benefits such as Social Security affect health outcomes among transgender individuals.

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Table 1. Health-related Outcome Variables: Descriptive Statistics (*N* = 417).

Continuous Variables	Range	*M*	SD	median
General Health	1 (*Poor*) – 5 (*Excellent*)	3.37	1.04	3 (*Good*)
Poor Physical Health (# days in past month)	0 - 30	5.55	8.42	2
Poor Mental Health (# days in past month)	0 - 30	10.69	10.45	7
Kept from Doing Usual Activities (# days in past month)	0 - 30	6.61	8.62	3
Categorical Variables	*n*	%		
BMI				
Underweight (<18.5)	16	3.9		
Normal (18.5 – 25.0)	168	41.2		
Overweight (25.0 – 30.0)	108	26.5		
Obese (>30.0)	116	28.4		
High Blood Pressure	128	31.8		
High Cholesterol	142	35.3		
COPD, emphysema, chronic bronchitis	17	4.3		
Depression (told by doctor in lifetime)	246	63.4		
Current depression	158	44.0		
Arthritis, gout, lupus, fibromyalgia	90	23.3		
Diabetes	16	4.0		
Asthma	107	26.7		
Anxiety	208	52.7		
Suicidal ideation	142	36.0		
Suicide attempt	39	9.9		
Any teeth removed	134	34.4		

Table 2. Multiple linear regression models predicting health variables.

	General Health (*N* = 337)		Poor Physical Health (*N* = 336)		Poor Mental Health (*N* = 336)		No. days kept from usual activities (*N* = 333)	
	Block 1	Block 2	Block 1	Block 2	Block 1	Block 2	Block 1	Block 2
Control Variables	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)
Health insurance (y/n)	-.08 (0.16)	-0.15 (0.16)	0.95 (1.37)	1.22 (1.38)	0.38 (1.61)	0.94 (1.62)	0.67 (1.33)	1.43 (1.34)
Exercise in past mo. (y/n)	0.61*** (0.13)	0.51*** (0.13)	-4.34*** (1.10)	-3.74*** (1.09)	-6.35*** (1.29)	-5.59*** (1.28)	-4.35*** (1.07)	-3.73*** (1.07)
Age	0.09* (0.04)	0.04 (0.04)	-0.17 (0.32)	0.09 (0.33)	-1.22** (0.38)	-0.92* (0.39)	-0.71* (0.32)	-0.34 (0.32)
Predictor Variables	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)	B (s.e.)
Race (White/POC)		0.09 (0.14)		-0.66 (1.27)		-1.06 (1.49)		0.98 (1.23)
Annual household income		0.24*** (0.05)		-1.40*** (0.42)		-1.82*** (0.49)		-1.58*** (0.41)
No. adults in household		-0.09^ (0.05)		0.50 (0.45)		0.29 (0.53)		0.57 (0.44)
No. children in household		0.02 (0.07)		-0.57 (0.62)		0.55 (0.73)		0.23 (0.60)
Model Results								
F-value	8.57***	8.18***	5.33*	4.45***	10.38***	6.73***	6.49***	5.48***
R	0.27	0.38	0.21	0.29	0.29	0.35	0.24	0.32
R^2	0.07	0.15	0.05	0.09	0.09	0.13	0.06	0.11
Adjusted R^2	0.06	0.13	0.04	0.07	0.08	0.11	0.05	0.09

^ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Logistic regression models predicting mental health variables.

	Depression (told by Doctor) (N = 326)				Current Depression (N = 310)				Anxiety (N = 338)				Suicidal ideation (N = 339)			
	Block 1		Block 2		Block 1		Block 2		Block 1		Block 2		Block 1		Block 2	
Control Variables	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio
Health insurance (y/n)	0.48 (0.33)	1.62	0.47 (0.35)	1.61	0.20 (0.37)	1.22	0.53 (0.39)	1.7	0.47 (0.33)	1.6	0.51 (0.34)	1.67	0.16 (0.35)	1.17	0.47 (0.37)	1.6
Exercise in past mo. (y/n)	-0.38 (0.28)	0.68	-0.27 (0.28)	0.77	-1.36*** (0.29)	0.26	-1.28*** (0.31)	0.28	-0.51^ (0.27)	0.6	-0.39 (0.27)	0.68	-0.77** (0.27)	0.46	-0.66* (0.28)	0.52
Age	-0.15^ (0.08)	0.86	-0.15 (0.09)	0.86	-0.30*** (0.09)	0.74	-0.23* (0.09)	0.8	-0.26*** (0.08)	0.77	-0.24** (0.08)	0.79	-0.21* (0.08)	0.81	-0.13 (0.09)	0.88
Predictor Variables																
Race (White/POC)			-0.80* (0.31)	0.45			-0.05 (0.35)	0.95			-0.38 (0.31)	0.69			0.41 (0.32)	1.51
Annual household income			-0.22* (0.11)	0.8			-0.53*** (0.12)	0.59			-0.27** (0.10)	0.76			-0.50*** (0.12)	0.61
No. adults in household			-0.41 (0.12)	0.96			0.11 (0.12)	1.11			0.02 (0.11)	1.02			0.05 (0.12)	1.05
No. children in household			0.08 (0.16)	1.08			0.24 (0.17)	1.27			-0.06 (0.15)	0.94			0.28^ (0.16)	1.33
Model Results																
Omnibus Model Test (χ^2)	6.80^ (df = 3)		18.04* (df = 7)		31.98*** (df = 3)		54.23*** (df = 7)		15.35** (df = 3)		24.96*** (df = 7)		13.27** (df = 3)		35.74*** (df = 7)	
Nagelkerke R^2	0.03		0.08		0.13		0.22		0.06		0.1		0.05		0.14	

^ p < .10. * p < .05. ** p < .01. *** p < .001.

Table 4. Logistic regression models predicting physical health variables.

	Arthritis, gout, lupus, fibromyalgia (N = 324)				Asthma (N = 338)			
	Block 1		Block 2		Block 1		Block 2	
Control Variables	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio	B(*SE*)	Odds Ratio
Health insurance (y/n)	1.00* (0.51)	2.72	1.17* (0.52)	3.23	0.66 (0.41)	1.94	0.74^ (0.43)	2.1
Exercise in past mo. (y/n)	-0.28 (0.30)	0.76	-0.33 (0.31)	0.72	-0.21 (0.29)	0.81	-0.29 (0.29)	0.75
Age	0.39*** (0.09)	1.48	0.44*** (0.10)	1.55	-0.10 (0.09)	0.9	-0.13 (0.09)	0.88
Predictor Variables								
Race (White/POC)			0.90* (0.36)	2.46			0.81* (0.32)	2.26
Annual household income			-0.11 (0.12)	0.89			0.07 (0.11)	1.08
No. adults in household			0.02 (0.14)	1.02			-0.18 (0.13)	0.84
No. children in household			-0.20 (0.22)	0.82			-0.22 (0.20)	0.8
Model Results								
Omnibus Model Test (χ^2)	26.54*** (df = 3)		34.14*** (df = 7)		4.45 (df = 3)		14.47* (df = 7)	
Nagelkerke R^2	0.12		0.15		0.02		0.06	

^ $p < .10$. * $p < .05$. *** $p < .001$.